# Risk Factors for Machinery-related Injury among Iowa Farmers:

## A Case–Control Study Nested in the Agricultural Health Study

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Farm machinery is a major cause of injury morbidity and mortality among farmers. This case–control study assessed risk factors for machinery-related injuries among Iowa farmers. A screener questionnaire sent to 6,999 farmers in 1998 identified 205 farmers who had machinery-related injuries requiring medical advice/treatment in the previous year. Possible risk factors for injury were assessed among these farmers compared with 473 farmers with no injury in the previous year. A multiple logistic regression analysis showed significant associations between machinery-related injury and hours per week spent on farmwork (OR = 2.02; 95% CI 1.38–2.94), fewer years of farming experience (OR = 1.79; 95% CI 1.14–2.79), wearing a hearing aid (OR = 4.37; 95% CI 1.55–12.25), and a high CAGE score suggesting problem drinking (OR = 2.49; 95% CI 1.00–6.19). This is the first study to show associations between machinery-related injury and hearing impairment, problem drinking, and fewer years of farming experience. These findings may be useful for future interventions to decrease injuries related to farm machinery. *Key words*: agriculture; farm machinery; injuries.

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Farmers are at risk for both fatal and nonfatal work-related injuries.[1] Several studies have shown that the chief causes of nonfatal farm-work–related injuries are machinery, animals, and falls.[2-4] A review of the literature on farm work-related injury reported that machines caused 18–35% of nonfatal farm injuries.[5] In spite of the importance of machinery as a cause for farm-work–related injury, few studies have assessed risk factors associated with machinery-related injuries on the farm.[6,7] Our study aimed to assess risk factors for machinery-related injuries among Iowa farmers.

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## METHODS

This is one of a series of injury case–control studies nested in a large prospective cohort study, the Agricultural Health Study (AHS).[8] The overall methods are presented in the report of the first of these nested injury case–control studies.[9] Details of the method used in the current case–control study of risk factors for machinery-related injuries follow.

### *Identification of Cases and Controls*

Using responses to a screener questionnaire that we mailed to 6,999 randomly selected private pesticide applicators (out of a total of 30,009 private pesticide applicator participants in Iowa) in November 1997, we identified injured farmer cases and uninjured farmer controls who could then be asked to participate in the case–control study. To maximize participation rates, we followed up with a repeat screener questionnaire mailing two and a half weeks after the first mailing and with telephone calls to administer the screening questionnaire five weeks later. Of the 6,115 participants who completed the screener questionnaire (response rate 87.4%), a total of 5,970 (97.6%) met the Census of Agriculture definition of "farmer" (reported gross annual sales of agricultural goods from the farm of $1,000 or more in the past 12 months).

*Cases.* We defined a farmer with a farm-work–related injury as one who answered "yes" to the following two questions: "During the past 12 months, were you injured seriously enough that you got medical advice or treatment?"[10] and "Was the injury in any way related to your farm operation (this includes activities such as

farm-related transportation on roadways, or any other aspect of your farm, such as raising livestock animals for recreation or home use."[11] We then identified a subgroup among these work-injured farmers who had sustained machinery-related injuries in the preceding 12 months, defined as those for which the primary or secondary source for injury [12] included one of the following: agricultural machinery, tractors, vehicle and mobile equipment parts, powered handtools, other farm equipment or machinery/tools, farm vehicles including trucks, skid loaders, machinery parts, and other tools (including drill bit and scoop shovel).

*Controls.* Controls were randomly selected from farmer respondents to the screening questionnaire who reported no injury requiring medical advice or treatment in the preceding 12 months. We considered those who had sustained non–farm-related injuries ($n$ = 133) ineligible to become cases or controls in this study, since the study focus was on farm-related injuries only.

### *Case/Control Interviews*

Trained interviewers completed computer-assisted telephone interviews of cases and controls from February through July 1998. We identified 521 eligible injury cases and 603 eligible controls based on responses to the screener questionnaire, which were confirmed at the outset of each case/control telephone interview. All eligible subjects who completed the telephone interview received $10. Interviewers made eight calling attempts, including attempts on evenings and weekends, before a subject was classified as a non-respondent. Of the 521 eligible cases, 431 (82.7%) were interviewed successfully. Of the 603 eligible and selected controls, 473 (78.4%) were interviewed successfully. Of the 431 interviewed cases, 205 were farmers who reported a machinery-related injury in the past year. This report is based on responses from these 205 cases and 473 controls.

### *Questionnaire*

We obtained data on injury outcome as well as risk factors for injury from one questionnaire covering the previous 12 months.

*Outcome variable.* For each machinery-related injury reported, the questionnaire asked about the following characteristics: major body part injured, major type of injury, description of event and source associated with the injury, and duration of any resulting hospitalization.

*Independent variables.* The questionnaire included sections for the following nine categories of independent variables: personal demographics; work history and workload characteristics, including work on and off the farm, and help with farmwork from spouse or other; personal medical history; depression, stress, and sleepiness; alcohol consumption and cigarette smoking history; attitudes toward risk; safety training history; farm finances; and farm products.

For current medical conditions, the questionnaire covered eyesight and hearing; use of glasses, contact lenses, and hearing aids; doctor-(ever)diagnosed arthritis/rheumatism, depression, heart disease, and asthma, derived from the Health and Retirement Survey questionnaire[13] and the National Health Interview Survey on Disability.[14] This section also covered presence and type of disabling impairments or health conditions, and regular medication usage, defined as taking medication at least one day per week during most weeks or for three months or more in the past year, excluding medications taken for injuries.

To assess for symptoms of depression, the questionnaire included the Abbreviated 11-item CES-D Depression Scale, (assessing symptoms over the preceding week).[15–16] To assess for symptoms of stress, the questionnaire included the Four-item Perceived Stress Scale (assessing symptoms over the preceding month),[17] with an added fifth question concerning changes in stress level over the last year. To assess daytime somnolence that may be associated with injury, the questionnaire included the Epworth Sleepiness Scale (no time frame mentioned).[18]

We assessed problem drinking with the CAGE questions (Have you ever felt you should cut down on your drinking? Have people ever annoyed you by criticizing your drinking? Have you ever felt bad or guilty about drinking? Have you ever taken a drink first thing in the morning to steady your nerves or get rid of a hangover?).[19] Each CAGE question response was "yes" or "no," where "yes" was the response associated with greater likelihood of problem drinking. We considered three or more "yes" responses to be a high CAGE score.[20] Additional questions covered current alcohol use and amount consumed. The questionnaire included cigarette-smoking questions (ever smoked versus currently smoke) from the Third National Health and Nutrition Examination Survey.[21]

The following questions on attitude towards risk were derived from Harrell[22] (no time frame specified): 1) "Farming is more dangerous than jobs in industry or manufacturing"; 2) "Accidents are just one of the occupational hazards of farming that must be accepted if you are going to be in the business"; 3) "Compared to other farmers I am very conscientious about avoiding accidents"; 4) "During a normal work week, it's common for me, while doing farm work, to experience a number of 'close calls' that under different circumstances might have resulted in personal injury or property loss"; and 5) " To make a profit, most farmers take risks that might endanger their health." We assigned scores to each response to define two risk attitude categories, "risk averse" and "risk accepting."[9] For questions 1, 2, 4, and 5, we counted an answer of "disagrees" as a zero and an answer of "agrees" as a 1. For question

3, we counted agreeing as a zero while disagreeing was a 1. We considered a subject "risk averse" if the cumulative score was 0–2 and "risk accepting" if the score was 3 to 5.[9]

Safety questions included those on source, date, and duration of training in any organized farm safety program or course, not just injury-prevention training.

Questions on farm finances and products, covering the preceding 12 months, included number of acres farmed, farm debt as a percentage of farm assets, types of crops or livestock raised on the farm, and the farmer's self-assessment of the financial condition of the farm.

The Institutional Review Board on human subjects at the University of Iowa reviewed and approved the study.

### *Coding of Variables*

We used the Bureau of Labor Statistics Occupational Injury and Illness Classification manual to code four characteristics for each reported injury: nature of injury, part of body affected, source, and event /exposure related to injury.[12] One investigator coded all the injuries. Two additional investigators reviewed the initial codings. The original codings were revised only when both secondary coders agreed on the changes.

For stress, depression, and sleepiness, we scored the responses according to standard scales and dichotomized the scales into high and low categories. A high stress score was in the upper 25% of all observed scores; a high depression score was in the upper 10% of all observed scores[23]; a high sleepiness score was greater than the median of all observed scores.

### *Statistical Methods*

Mean ages of cases vs controls were compared using Student's *t*-test. Independent variables for bivariate analysis were obtained from questionnaire responses to the nine risk-factor categories described above. We performed bivariate analyses to assess the association between each independent variable and the dependent variable, which was presence/absence of at least one machinery-related injury in the previous year. We used the Higgins and Koch[24] variable-selection method to construct a logistic regression model. For this procedure, we included all independent variables, except those we thought were likely to have resulted from an injury in the preceding year (depression, stress, and attitudes toward risk). We assessed the strength of association between the independent variables and the dependent variable by calculating the Mantel–Haenszel[25] chi-square, selecting the variable with the largest chi-square, significant at $p \leq 0.05$, stratifying by that variable, and re-analyzed the remaining variables. We repeated this procedure until no further independent variables were significant at $p \leq 0.05$. We then entered the chosen variables (base model) into a forward selection multivariable logistic regression model. We compared results of that model with those of a backward elimination model and found no difference in the variables remaining in the final models. We assessed the goodness of fit of the resulting model.[26] We then added to the base model, one by one, those variables that could have resulted from the injury (depression, stress, and attitudes towards risk variables) to assess each variable's strength of association with machinery-related injury, while adjusting for the independent variables in the base model.

The unit for analysis was the individual farmer, regardless of the number of injuries the farmer reported. Analyses were completed using SAS 6.12.

## RESULTS

There were 205 farmers with at least one machinery-related injury, and they had sustained 228 machinery-related injuries. Cases were younger than controls (36.4 ± 24.9 vs 42.7 ± 23.3 years old, $p = 0.002$) and had fewer years of farming experience (26.1 ± 11.5 vs 29.1 ± 11.9 years, $p = 0.003$). Twenty-three subjects had required hospitalization for their machinery-related injuries. The nature, primary body part affected, and source and event associated with each of the injuries are presented in Table 1. The most frequent injuries were cuts/lacerations, sprains/strains/tears, and fractures. Finger and back were the most frequently reported parts of the body injured. Although tractors, combines, and conveyors were the single largest external sources of injury, more than half the injuries were caused by diverse machinery included in the category of "all others." That category included vehicle and mobile equipment parts; powered hand tools; other farm equipment, machinery, tools; farm vehicles including trucks; skid loaders; machinery parts; and other tools (including drill bit and scoop shovel). The events most frequently causing injuries were being struck by a slipping handheld object and falling from a nonmoving vehicle.

In Table 2 are the results of bivariate analyses, adjusted for age, showing the following risk factors/variables significantly associated with machinery-related injuries: high CAGE score, fewer years of farming experience, long work week on the farm, needing help from people other than a spouse on the farm, high debt/asset ratio, and high stress score. Part-time farm work and off-farm work were protective from injury.

The results of multiple logistic regression analysis (Table 3) showed that fewer years of farming experience, long work weeks, wearing a hearing aid, and high CAGE score were significantly associated with injury. A Hosmer and Lemeshow goodness-of-fit test[26] resulted in a $p = 0.91$, indicating an adequate fit for this model.

When we examined the risk factors that might result from injury or precede it (depression, stress, and atti-

tude towards risk) by adding them individually to the logistic regression base model that included the aforementioned significant factors, we found that none was significantly associated with injury. When we examined the other potential risk factors that had not been selected through the Higgins and Koch method,[24] we found that taking medications was significantly associated with farm injury (OR = 1.55; 95% CI, 1.02–2.35).

When we entered the following interaction terms into the base model, we found no significant relationship between interaction terms and machinery-related injury: farm work hours per week/farm work experience; farm work hours per week/wears hearing aid; farm work hours per week/CAGE score; farm work experience/CAGE score. Interaction terms for CAGE score/wears hearing aid and farm work experience/wears hearing aid could not be assessed because no one who reported wearing a hearing aid had less than 25 years of farming experience or a high CAGE score.

## DISCUSSION

The major findings of this study were the associations between machinery-related injury and fewer years of farming experience, longer farm work weeks, wearing a hearing aid, and symptoms suggesting problems with alcohol.

Because data on injury outcomes and risk factors were collected at the same time, there are limitations in our ability to attribute directionality of cause and effect. For example, increased alcohol consumption could result from injury, instead of being a risk factor that precedes injury. However, our results showed an association between problem drinking behaviors (assessed by the CAGE questions) and machinery-related injury, but no association between current amount of alcohol consumed and machinery-related injury. These results suggest that chronic alcoholism preceding the injury may be a risk factor for machinery-related injury.

The CAGE questions have been used in epidemiologic studies to identify alcoholism and chronic problem drinking.[19] Several studies have assessed current alcohol use as a risk factor for nonfatal farm-work–related injury.[2,27–33] Two of those studies[29,32] found significant associations between overall farm injuries and alcohol consumption. Both used amount of alcohol consumption per week as the independent variable; neither assessed chronic alcoholism with CAGE questions. No information was available from those studies on risk factors for specific causes of injury, such as machinery-related injury. Zwerling et al.[20] assessed both current alcohol consumption and CAGE question responses as risk factors for non-farm occupational injures in 374 injured older workers. They reported increased odds of occupational injury for subjects who had five or more drinks daily (OR = 4.45, 95% CI 1.77– 11.16) and for those with three or more positive responses to the CAGE questions (OR = 1.68; 95% CI 1.04–2.69). To our knowledge, the present study was the first to assess the relationship between alcohol and nonfatal machinery-related farm injuries. Our results should be interpreted in light of potential power limitations in the study. Although we found that the odds for a machinery-related farm injury for those with three or more positive CAGE responses were 2.5 times higher than for those with only one or two positive CAGE responses, the 95% confidence interval was fairly wide, with the lower limit at 1.0009. A larger study would be needed to confirm statistical significance of this finding.

The present study was, to our knowledge, the first to assess the association between hearing impairment and machinery-related injuries among farmers. Several studies have assessed hearing impairment in relation to total injuries on the farm.[4,28,30–32,34] Hwang et al.[35] reported significantly increased odds of injury among farmers with self-report of problems hearing (OR = 2.56, 95% CI 1.22–2.83). The rest of the studies did not show significant relationships between total injuries

**TABLE 1. Characteristics of the 228 Machinery-related Injuries among 205 Iowa Farmers**

| | No. of Injuries | % of Total Injuries |
|---|---|---|
| Nature of Injury | | |
| Cuts, lacerations | 56 | 24.6 |
| Sprains, strains, tears | 38 | 16.7 |
| Fractures | 33 | 14.5 |
| Dislocations | 23 | 10.1 |
| Bruises, contusions | 19 | 8.3 |
| All others* | 59 | 25.9 |
| Part of body injured | | |
| Finger | 44 | 19.3 |
| Lumbar region or back | 35 | 15.4 |
| Eye | 20 | 8.8 |
| Hands, except fingers | 19 | 8.3 |
| Shoulder | 19 | 8.3 |
| All others* | 91 | 39.9 |
| Source of injury | | |
| Tractor | 33 | 14.5 |
| Combine | 31 | 13.7 |
| Conveyors | 18 | 7.9 |
| All others* | 146 | 64.0 |
| Event causing injury | | |
| Struck by slipping handheld object | 37 | 16.2 |
| Fall from nonmoving vehicle | 26 | 11.4 |
| Struck by falling object | 22 | 9.6 |
| Struck by dislodged flying object | 20 | 8.8 |
| Caught in running equipment/machinery | 19 | 8.3 |
| Struck against stationary object | 18 | 7.9 |
| All others* | 86 | 37.7 |

*Each category included in "all others" accounted for fewer than 7% of injuries.

**TABLE 2. Bivariate Associations of Risk Factors with Machinery-related Injuries in the Preceding 12 Months in Iowa, 1997; 205 Farmers with Machinery-related Injuries (Cases) vs 473 Farmers with no Injury (Controls)***

| Variable/Risk Factor | Variable/Risk Factor Present | | Variable/Risk Factor Absent | | Odds Ratio† | 95% CI† |
|---|---|---|---|---|---|---|
| | Cases | Controls | Cases | Controls | | |
| Demographic features | | | | | | |
| Male gender | 203 | 465 | 2 | 8 | 1.66 | 0.33–8.32 |
| Education more than high school | 103 | 206 | 102 | 267 | 1.30 | 0.93–1.81 |
| Not married | 22 | 47 | 183 | 426 | 1.03 | 0.60–1.77 |
| Principal operator | 179 | 414 | 26 | 59 | 1.11 | 0.68–1.83 |
| Lives on farm | 191 | 428 | 13 | 45 | 1.54 | 0.81–2.94 |
| Had safety training prior to any injury | 73 | 174 | 131 | 298 | 0.91 | 0.65–1.29 |
| **Farmwork experience ≤ 25 years** | 120 | 206 | 85 | 267 | 1.69 | 1.13–2.52 |
| Personal habits | | | | | | |
| Current smoker | 21 | 48 | 182 | 425 | 1.03 | 0.60–1.75 |
| Ex-smoker | 57 | 126 | 146 | 347 | 1.15 | 0.79–1.67 |
| Drinks alcohol currently | 161 | 357 | 44 | 116 | 1.12 | 0.75–1.66 |
| Has 2 or more drinks per day | 36 | 86 | 124 | 271 | 0.87 | 0.56–1.37 |
| **CAGE score high** | 11 | 10 | 178 | 415 | 2.41 | 1.03–5.59 |
| Farming factors | | | | | | |
| Farm size small (≤ 500 acres) | 83 | 229 | 117 | 232 | 0.75 | 0.53–1.05 |
| Large livestock on farm | 157 | 342 | 44 | 123 | 1.20 | 0.81–1.79 |
| **Debt/asset ratio ≥ 10%** | 134 | 268 | 60 | 183 | 1.44 | 1.01–2.07 |
| Self-reported financial condition poor/fair | 36 | 95 | 165 | 369 | 0.86 | 0.56–1.31 |
| Workload factors | | | | | | |
| Farmer worked 50 or more weeks on farm in past year | 164 | 355 | 41 | 117 | 1.27 | 0.85–1.91 |
| **Farmer worked 50 or more hours/week on farm in past year** | 142 | 252 | 63 | 214 | 1.86 | 1.31–2.63 |
| Spouse helped 8 or more weeks on farm in past year | 109 | 233 | 96 | 240 | 1.15 | 0.83–1.60 |
| Spouse helped 2 or more hours/week on farm in past year | 115 | 230 | 90 | 238 | 1.30 | 0.93–1.81 |
| **Others helped 12 or more weeks on farm in past year** | 113 | 213 | 92 | 257 | 1.47 | 1.06–2.05 |
| Others helped 24 or more hours/week on farm in past year | 104 | 234 | 99 | 232 | 1.05 | 0.75–1.46 |
| **Farmer worked part-time on farm past year** | 12 | 52 | 193 | 421 | 0.52 | 0.27–0.97 |
| Farmer had job off farm past year | 63 | 157 | 142 | 314 | 0.88 | 0.62–1.26 |
| **Farmer worked 12 or more weeks off farm past year** | 35 | 115 | 170 | 355 | 0.63 | 0.41–0.96 |
| Medical conditions | | | | | | |
| Wears eyeglasses | 116 | 317 | 89 | 156 | 0.72 | 0.50–1.02 |
| Self-reported vision poor/fair | 6 | 31 | 199 | 442 | 0.47 | 0.20–1.10 |
| Wears hearing aid | 9 | 11 | 196 | 462 | 2.23 | 0.92–5.39 |
| Self-reported hearing poor/fair | 40 | 95 | 164 | 377 | 1.04 | 0.69–1.58 |
| Difficulty hearing normal conversation with hearing aid | 58 | 106 | 147 | 365 | 1.40 | 0.96–2.04 |
| Doctor-diagnosed arthritis/rheumatism | 35 | 74 | 170 | 395 | 1.23 | 0.78–1.93 |
| Doctor-diagnosed depression | 16 | 23 | 187 | 448 | 1.79 | 0.93–3.43 |
| Depression score high | 24 | 38 | 178 | 430 | 1.52 | 0.88–2.63 |
| Doctor-diagnosed heart disease | 15 | 49 | 190 | 423 | 0.78 | 0.42–1.44 |
| Doctor-diagnosed asthma | 12 | 20 | 193 | 452 | 1.45 | 0.70–3.04 |
| Pre-existing disability | 40 | 82 | 156 | 390 | 1.26 | 0.83–1.92 |
| Sleepiness score high | 95 | 216 | 109 | 257 | 1.06 | 0.77–1.48 |
| Takes medications regularly | 69 | 157 | 136 | 316 | 1.19 | 0.83–1.72 |
| Risk attitudes and stress | | | | | | |
| Risk acceptance score high | 30 | 72 | 145 | 311 | 0.88 | 0.55–1.41 |
| **Stress score high** | 51 | 78 | 154 | 395 | 1.65 | 1.11–2.43 |

*Case and control totals in the table do not always equal 205 and 473, respectively, due to missing data.
†Age-adjusted odds ratio and 95% confidence intervals.
**Bolded** variables are those for which the 95% confidence interval does not contain 1.00.

and hearing impairment. Confounding by cumulative exposure to machinery may account for our finding. In other words, it is possible that increased cumulative exposure to farm machinery among cases was a cause of both the hearing impairment (through noise exposure) and machinery-related injuries (through increased contact with machinery) in our study.

Farmers with fewer than 25 years of farming experience had an increased risk for farm-machinery–related injuries in the present study. We further investigated this association by conducting a Cochran-Armitage test for trend over four quartiles of years of farming experience. Compared with the least experienced group (0–19 years of farming experience), risk for injury decreased as years of farming experience increased [odds ratio 0.81 (95% CI 0.69–0.94) for those with 20 to 25 years of farming experience; odds ratio 0.66 (95% CI 0.48–0.89) for those with 26 to 36 years of farming experience; odds ratio 0.53 (95% CI 0.33–0.84) for those with more than 36 years of farming experience]. A possible explanation is that farmers become more experienced in the safe use of machinery over time. Another explanation is that farmers' work activities change as they become more experienced, possibly resulting in less time exposed to machinery. Although age and years of farming experience are highly correlated, age was not significantly associated with machinery-related injury in this study. Neither of the two other studies that examined risk factors for machinery-related farm injuries found significant associations with age in their final models.[6,7]

Our study confirms others that have shown associations between overall farm injury (machinery-related injury not used as a separate subgroup) and work hours on the farm.[2,4,29] Both previous studies of risk factors that specifically addressed machinery-related farm injury showed significant associations between hours worked per week and injury.[6,11] This association is expected, since work hours define the period of risk for injury.

These results should be interpreted in the light of several study limitations. Because of the study design, we cannot be certain of the directionality of cause and effect for some risk factors for machinery-related injury. We attempted to adjust for this by examining separately those risk factors that could have been a consequence of the injury, such as depression, stress, and attitude towards risk. Generalizability of the findings to Iowa farmers is another area where caution is needed in interpretation. Compared with Iowa farmers,[36,37] we found that participants in the Agricultural Health Study were about five years younger and more likely to work on larger farms. It is possible that these differences may be associated with differences in injury risks or exposures. Another potential limitation is recall bias, in that injured participants' recall and reporting of risk factors may differ from those of uninjured participants. In addition, we have no validation through medical or hospital records for the injury outcomes, which are based only on participants' self-reported responses to our questionnaire.

**TABLE 3. Multiple Logistic Regression Analysis of Risk Factors for Machinery-related Injuries in the Preceding 12 Months in Iowa, 1997***

| Risk Factor | Odds Ratio | 95% Confidence Interval |
|---|---|---|
| Age in years | | |
| < 40 | 1.00 | Reference |
| 40–64 | 0.97 | 0.60–1.54 |
| ≥ 65 | 0.66 | 0.27–1.56 |
| Farmer worked 50 or more hours/week on farm in past year | 2.02 | 1.38–2.94 |
| Farmwork experience | | |
| ≤ 25 years | 1.79 | 1.14–2.79 |
| Wears hearing aid | 4.37 | 1.55–12.25 |
| CAGE score high | 2.49 | 1.00–6.19 |

*Each odds ratio has been adjusted for all other risk factors in the table.

Strengths of the study included the study size, which allowed for detailed assessment of risk factors for an important subgroup of farm injuries, those caused by machinery. The high response rate helped assure that the participants were representative of the farmers who were asked to participate in the study. We were able to examine many potential risk factors to assess associations suggested in the few other studies available that examined machinery-related injuries among farmers and to identify new associations.

In summary, this is the first study to show associations between machinery-related injury and hearing impairment, problem drinking, and fewer years of experience as a farmer. These findings may provide useful information and direction for future intervention and prevention studies designed to decrease injuries related to the use of farm machinery.

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